New evaluations of n+Cu and n+Zr nuclear data for neutron energies up to 200 MeV

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The new evaluations of the neutron nuclear data were performed for the stable zirconium ^{90,91,92,94,96}Zr and ^{63,65}Cu isotopes in the energy range from $1 \cdot 10^{-11}$ up to 200 MeV. The new evaluations include a complete set of data as required for the particle transport simulations, activation, heating, shielding and radiation damage calculations in the fission and fusion reactor applications.

The modern TALYS-1.8 computer code is used to generate a full consistent set of nuclear reaction data for the neutron energies up to 200 MeV. The geometry dependent hybrid model was included in the code as a new option and used for the description of the pre-equilibrium reactions. The optical model calculations are performed in TALYS making use of default and externally read optical model potentials. The nuclear model parameters in TALYS were adjusted to get the best fit of the available experimental data for individual reaction cross sections and particle emission spectra. Well approved reaction cross-section data from other evaluations were adopted as far as it was suitable.

The resonance data for the new evaluations were chosen on the basis of the comparison of the available data sets with existing experimental results and criticality measurements. If available the new evaluations of the resonance parameters based on the latest fine measurement of the elastic scattering, capture and total cross sections are included in the new data files.

The covariance data for all reaction cross sections up to 200 MeV are included in the new evaluations to enable uncertainty calculation using the new data files. The Unified Monte Carlo Approach was applied to generate covariance matrixes based on the nuclear model results together with the relevant experimental data.

The new evaluated data files for n+^{90,91,92,94,96}Zr and ^{63,65}Cu were generated using a break at 20 MeV neutron incident energy for low and high energy parts of the nuclear data representation in accordance with ENDF-6 format rules. The new evaluations were intensive benchmarked by analyses of the integral experimental measurements as available in the data base for fission and fusion technology applications. These data files, produced in the frame of the European fusion program, finally will be made available for inclusion in the JEFF nuclear data library.